Extended Abstract
Volume 9:2, 2021

Strategies and Priorities in Trees Reproductive Allocation

Eliezer E Goldschmidt

The Hebrew University of Jerusalem, Israel Email: eli.goldsmit@mail.huji.ac.il

Abstract

The survival of a single tree is not contingent on sexual reproduction. However, the long-term survival of tree species necessitates an effective means of reproduction, whether asexual or sexual. Most tree species achieve reproductive maturity in the wild. After several decades of adolescence, and even then, sexual adolescence. Reproduction occurs on an irregular basis, frequently in a masting phase. Estimates of the reproductive allocation (= the percentage of annual photosynthate transferred to sexual reproduction) in forest trees show a long, progressive increase that peaks at 50% in 'mast' years but never exceeds 20% on average.

Certain subtropical and tropical fruit trees (Citrus, Olive, Mango, Avocado), on the other hand, devote a significant amount of resources in abundant flowering and fruiting. A grapefruit tree's reproductive allocation has been calculated to be 79 percent. Fruit overload and exhaustion of carbohydrate reserves may cause some Citrus cultivars to collapse.
The reasoning behind this behaviour could be that these trees are exposed to environmental challenges in their natural, native habitats, including dryness, which threatens their survival. As a result, they devote all of their energy on sexual reproduction, which is their top goal.

Environmental challenges, on the other hand, do not threaten the survival of the aforementioned temperate and boreal forest trees; vegetative growth is their top priority, and they have a more moderate reproductive allocation on average.

In dioecious tree species, studies of sexual dimorphism often discover patterns consistent with a higher cost of reproduction in female (pistillate) individuals, who also display lower growth.

In life-history models that predict patterns of reproductive allocation, growth curves, and other aspects of plant ontogeny, such "costs of reproduction" are central: such "costs of reproduction" are central to life-history models that predict patterns of reproductive allocation, growth curves, and other aspects of plant ontogeny.
However, because of the apparent relevance of biophysical processes (such as hydraulic limiting effects), it is often assumed that reproductive physiological effects have a little, if any, role in determining age-related patterns of tree growth and functional features. This chapter evaluates existing data to detect and quantify the role of reproduction in tree functional biology, using meta-analysis to combine results from many researches when possible. According to life-history theory, trees have a long period of pre-reproductive growth and a pattern of increasing reproductive allocation with size.

Analyses of growth curves from some dioecious tree species reveal sexual dimorphism in patterns of growth drop late in tree ontogeny, indicating that reproduction has a significant role in influencing the shape of growth declines. Finally, reproduction cannot be discounted as a minor factor in determining age-related changes in tree functional biology. The physiological mechanisms behind reproductive impacts, as well as their comparative biology and interactions with other growth-limiting systems, demand a lot more research.

This work is partly presented at Joint Event International Conference on Plant Science Paris, France